RECENT OUTBREAKS OF PARVO-B19 AND THE NEED FOR NEW TRANSFUSION SAFETY MEASURES?

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USUAL PARVOVIRUS B19 EPIDEMICS

B19V is a respiratory virus responsible for the fifth disease affecting children

Infections occur according to a seasonal cycle with epidemics of variable size occurring in the spring .
Larger epidemics have been reported every 3 to 4 years

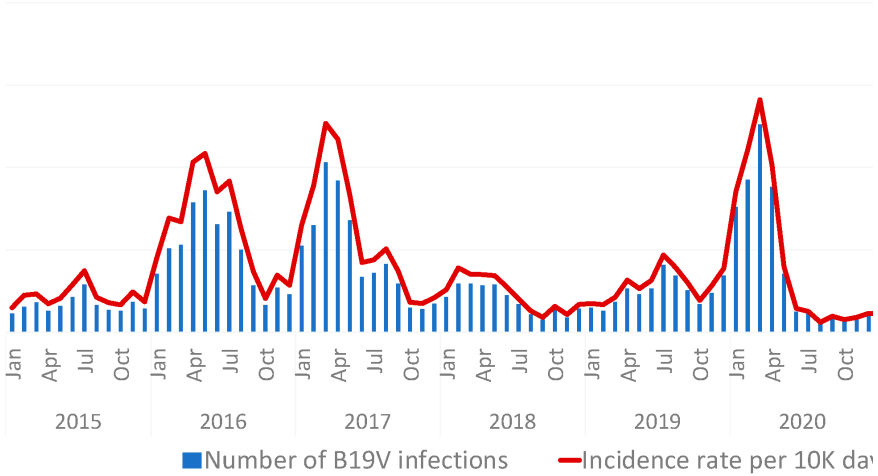
During outbreaks

- 10% of cases occur among children under 5 years old,
- 70% of cases in children 5 to 15 years
- 20% of cases among patients older than 15 years

Seroprevalence increases with age

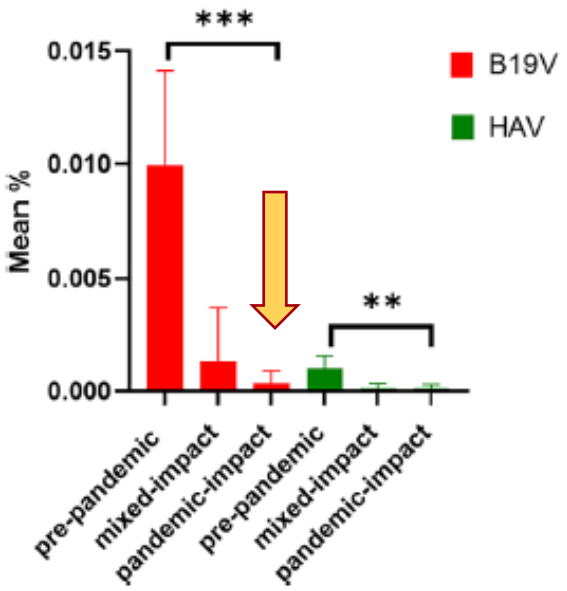
- 5–10% in young children,
- 50% in young adults,
- 90% in elderly people;

The probability of infection decreases with age.



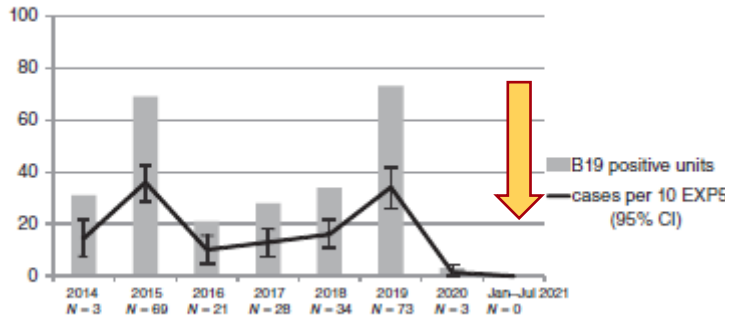
DECREASE OF B19 INFECTIONS DURING THE COVID PERIOD

Canada



Drews et al Vox Sanguinis. 2024;119:624–629..

Spain (Catalonia)



Sauleda et al Vox Sanguinis. 2022;117:626–627.

The Netherlands

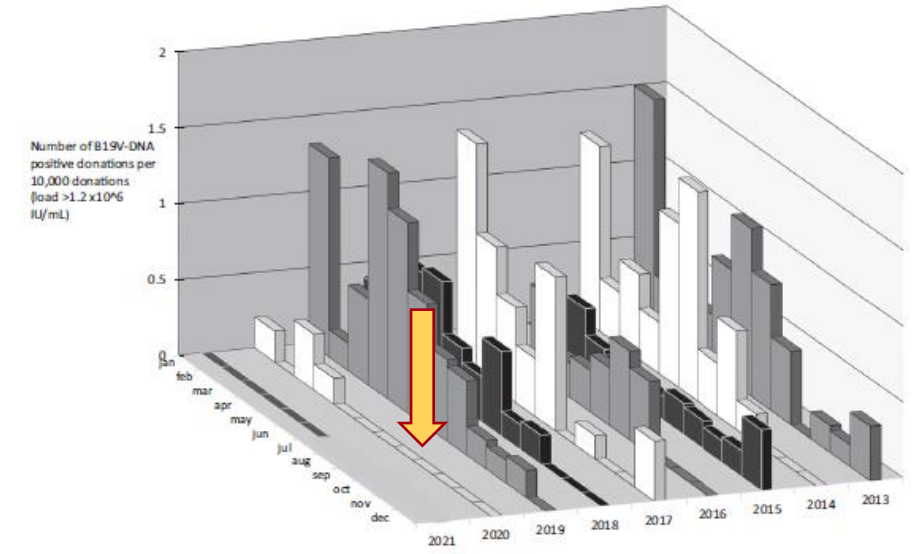


FIG 1 The number of parvovirus B19 highly viremic donations per month per 10,000 donations (donations with a B19V DNA load of $>1.2 \times 10^6$ IU/ml).

Molenaar-de Backer, Microbiol Spectr 9:e00253-21.

Public health measures taken to limit the spread of SARS-CoV-2 reduced the transmission of other respiratory infections, such as B19V

INCREASED VIRAL CIRCULATION OF PARVOVIRUS B19 IN 2023-24

ISRAEL (general population- Jan 2015 -Sep 2023)

Increase in B19V infections with more than 40% of total infections detected over the period, which were recorded during the last 9 months

In 2023

- the incidence rate was 6.6 times higher than in previous years and 9.2 times higher when compared to COVID period (2020–2022)
- The highest B19V incidence rates extended into the autumn months.
- Children constituted over 80% of infections,
- Pregnant women experienced an infection rate 11.5 times higher than in previous years.

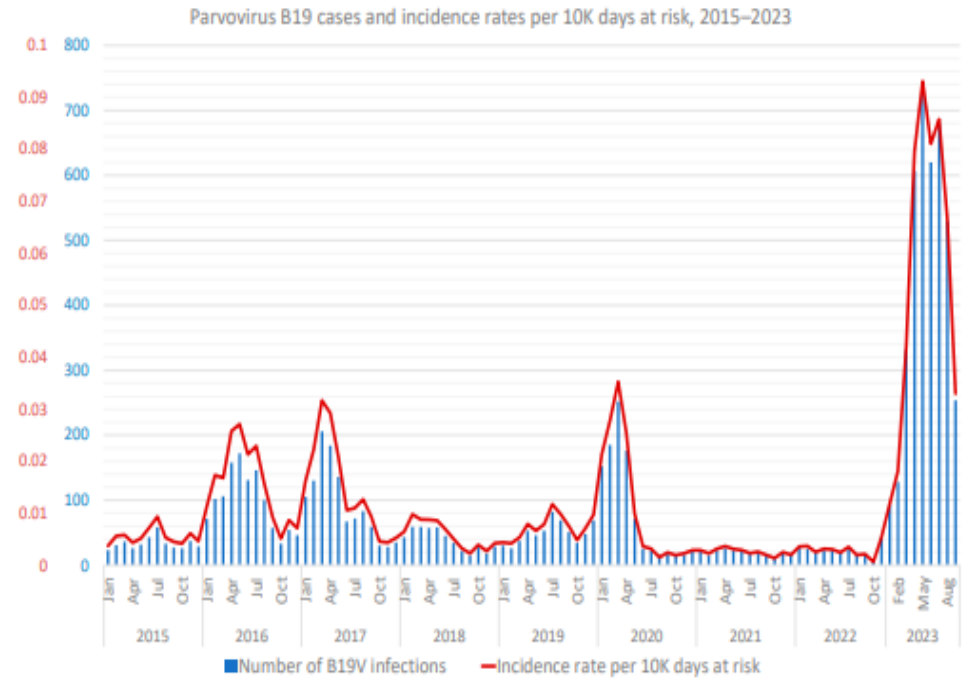


Figure 1. Parvovirus B19 incidence rates per 10,000 person days at risk between 2015 and 2023, by month.

Patalon. et al. Viruses 2023, 15, 2261. https://doi.org/10.3390/v15112261

INCREASED VIRAL CIRCULATION OF PARVOVIRUS B19 IN 2023-24

FRANCE (general population)

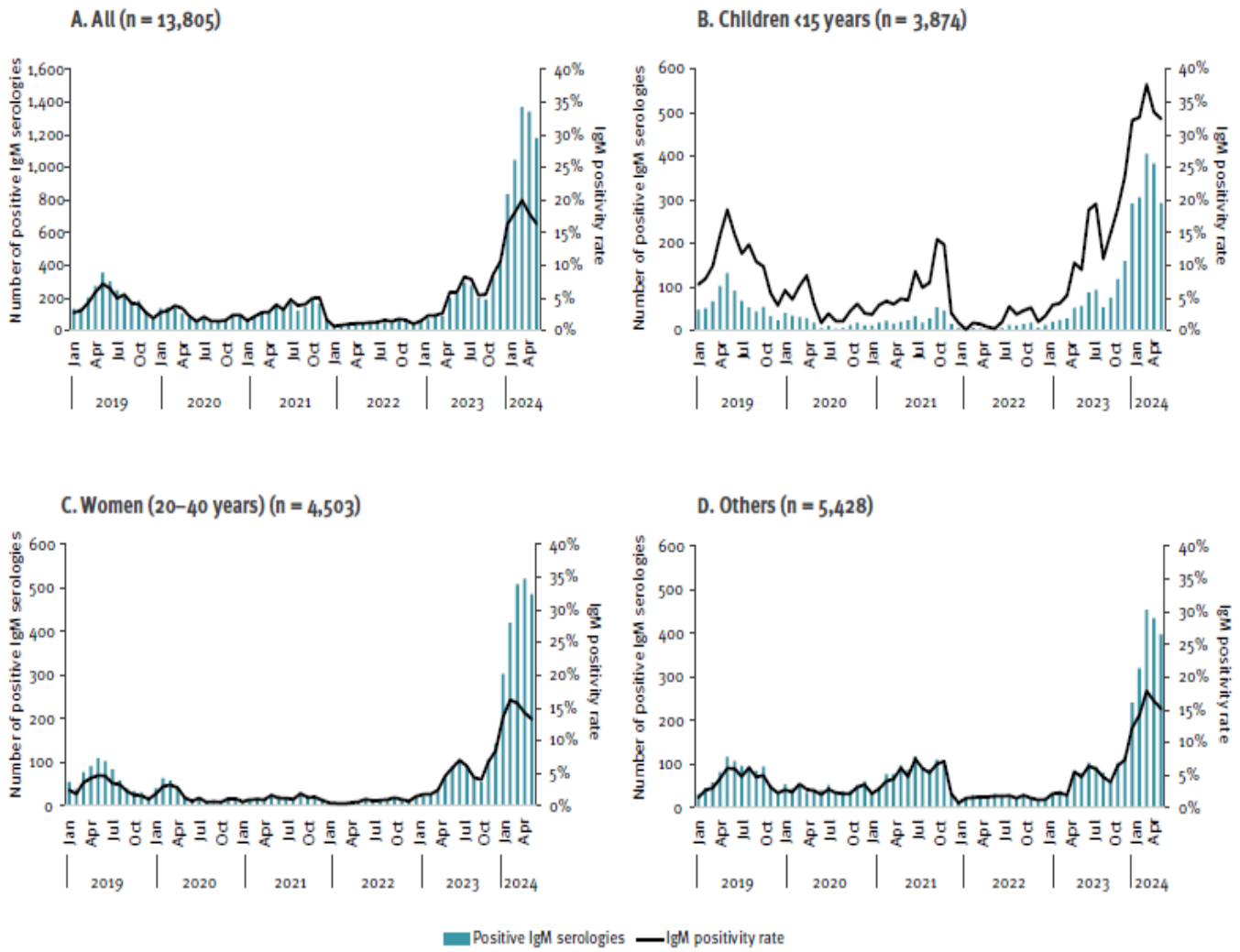
From April 2023 to March 2024 the number of B19V IgM-positive serologies was 4 times higher than in the previous epidemic in 2019

July 2023 : the first alert concerned a major increase of infections in children (> 50% had sickle cell disease)
Peak in March 2024

From January to May 2024, 5 deaths were identified in children <1 year. 4 before the first 10 days of life linked to maternal–foetal B19V infection.

FIGURE 2

Number of positive parvovirus B19 IgM-positive serologies and positivity rate, by population category, France, January 2019–May 2024 (n = 13,805)



D'Humières et.al . Euro Surveill 2024 Jun;29(25):2400339. doi: 10.2807/1560-7917.ES.2024.29.25.2400339

INCREASED VIRAL CIRCULATION OF PARVOVIRUS B19 IN 2023-24 FRANCE

Since 2015, in France all blood donations are tested in pools of 96 with a threshold of 10^4 IU/mL B19V DNA (10^6 IU/mL at donation level) for blood products intended to plasma fractionation

From January 2015 to March 2024
3 periods mean prevalence in pools
P1: pre covid 0.63% (95% CI: 0.59–0.68)
P2: covid 0.07% (95% CI:0.05–0.09)
P3: post covid 2.40% (95% CI: 2.24–2.56)

B19V-positive donations decreased during the COVID-19 pandemic, followed by a strong rebound in 2023 and unusually high circulation during winter 2023/24 10 times higher in December 2023-March 2024 vs the pre-pandemic period

Atypical persistence during winter and high circulation levels continuing in early 2024

FIGURE 1
Annual prevalence of parvovirus B19 DNA-positive pools of 96 blood donations, France, January 2015–March 2024 (n = 270,508 pools tested)

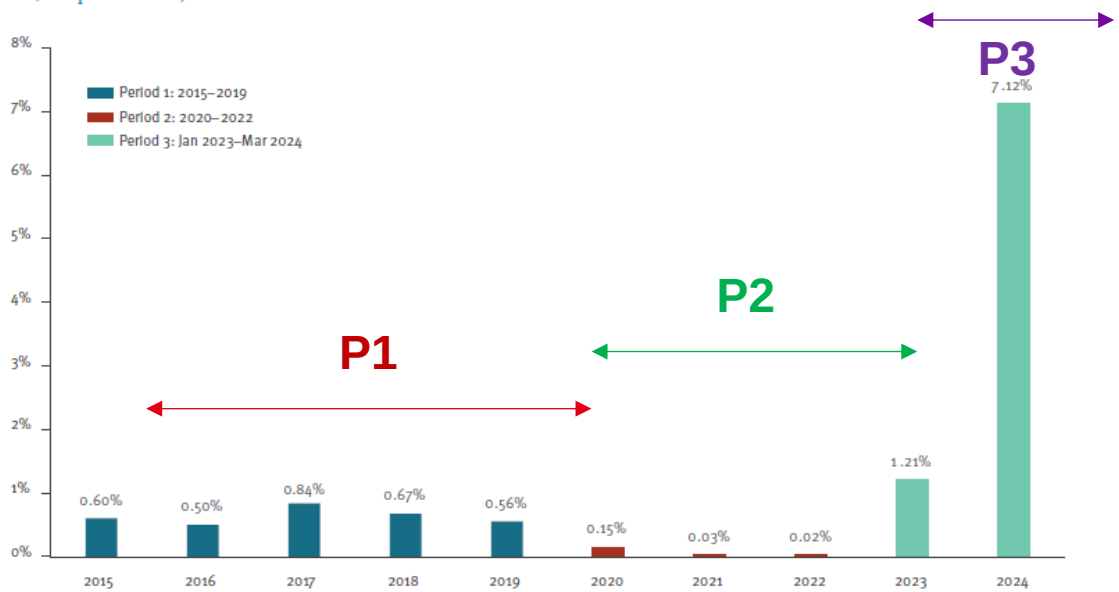
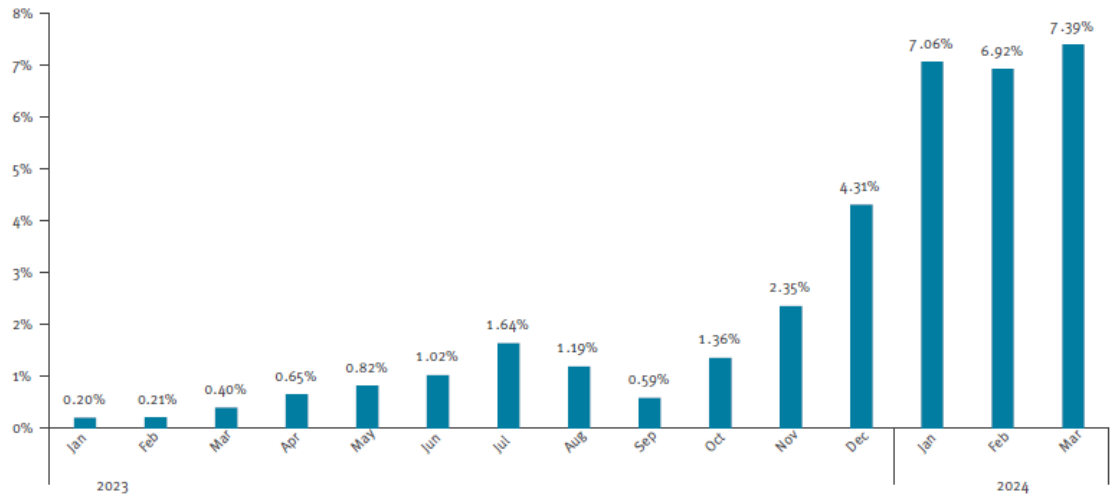


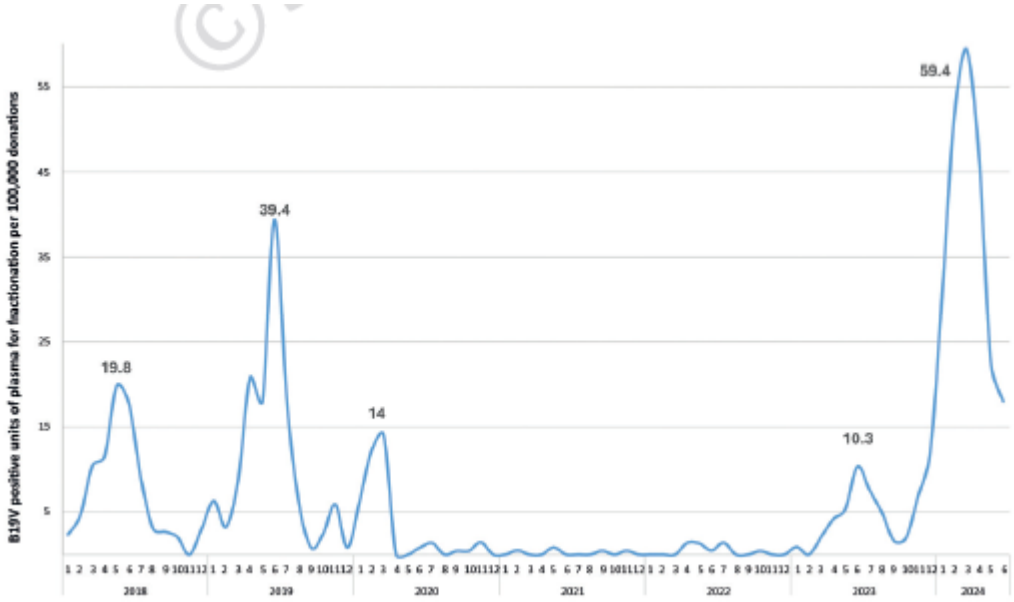
FIGURE 3
Monthly prevalence of parvovirus B19 DNA-positive pools of 96 blood donations, France, January 2023–March 2024 (n = 35,390 pools tested)



Guillet . et al. Eurosurveillance 2024

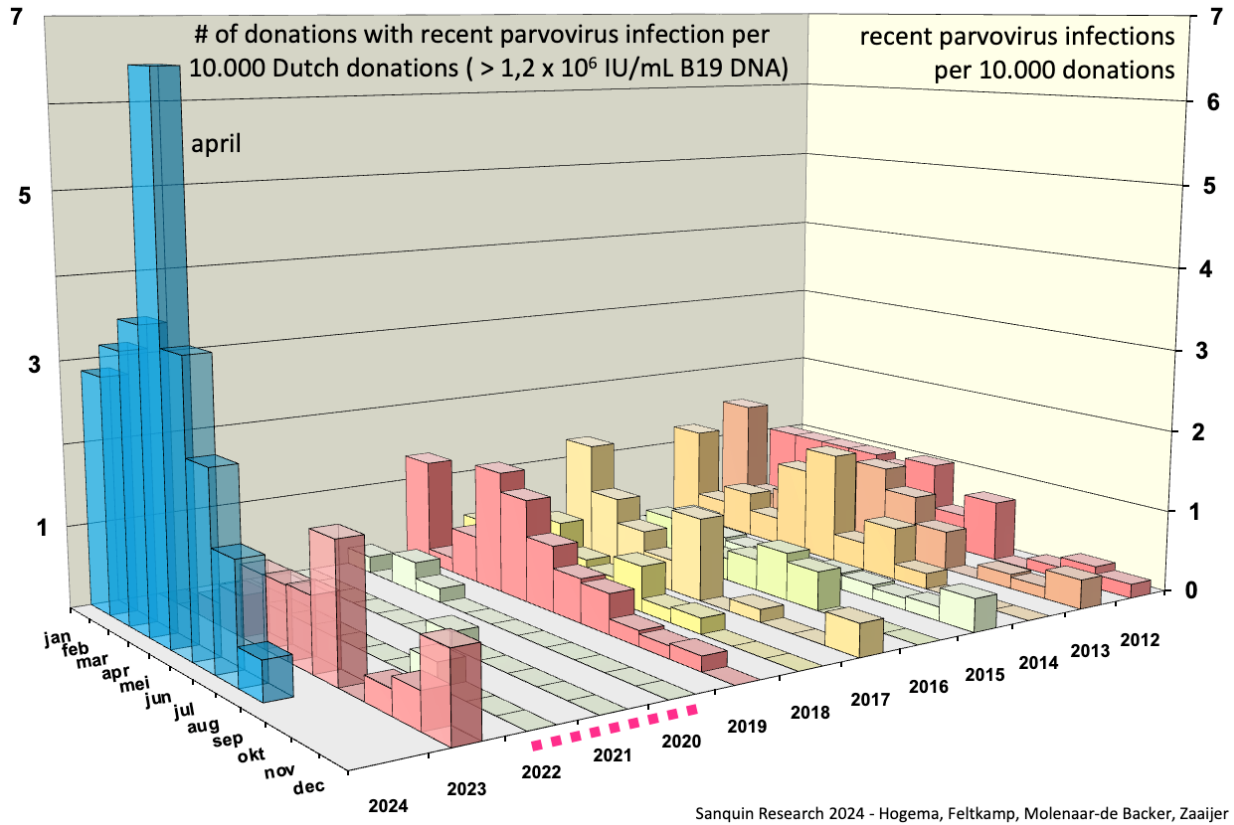
INCREASED VIRAL CIRCULATION OF PARVOVIRUS B19 IN BD 2023-24

ITALY



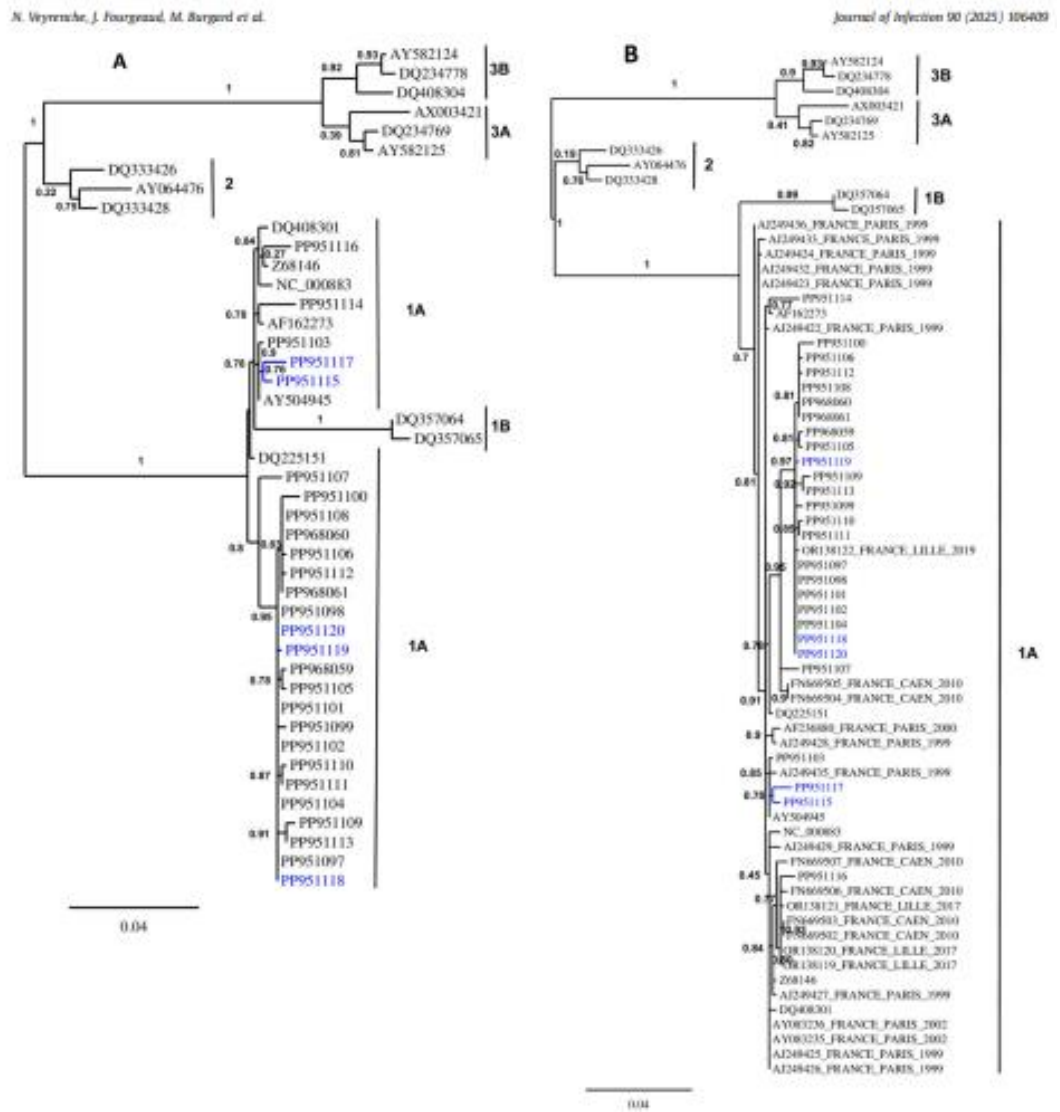
Candura et al. Blood Transfus. 2025; 23(2): 168-175

NL



Virological characterization of Parvovirus B19 isolated during the atypical 2023-2024 outbreak in France

Nicolas Veyrenche [a,b,*], Jacques Fourgeaud [a,b], Marianne Burgard [a], Slimane Allali [c,d], Julie Toubiana [c], Yaël Pinhas [c], Pierre Frange [a,b], Tiffany Guilleminot [a,b], Neil Derridj [e], Jérémie F. Cohen [c], Marianne Leruez-Ville [a,b]



27 strains from 2023 epidemic sequenced in Necker Hospital, Paris
All belonged to genotype 1a closely related to pre-2019 strains.

No evidence of the emergence of a new strain that could explain the B19V epidemic in France

non-pharmaceutical interventions implemented during the COVID-19 pandemic were followed by an immunity gap that may have led to large outbreaks extending beyond the usual season and possibly affecting older children

PARVOVIRUS B19V INFECTION AND BLOOD TRANSFUSION

Evidence of transfusion transmission of B19V but significant cases resulting from transfusion appear to be rare

UK : 1 case (RBC) between 1996 and 2022 (SHOT)
Germany : 0 case 1997 and 2017 (Juhl D Front Med. 2018)
Italy : 0 case between 2017-2023 (Candura Blood Transfus. 2025)
France : 9 cases between 2002-2024 (French Haemovigilance system)

Parameters of transfusion risk

Viremia :17.5 days but B19V DNA can persist for months or years. B19V DNA positivity in plasma likely reflects the presence of non-infectious “naked” DNA strands rather than active virions.

Zaaijer HL, Epidemiol Infect. 2004 - Molenaar-de Backer, J.Clin.Virol.2016

Viral load : Transmissibility via transfusion is associated with DNA levels above 10^5 IU/mL
> 95% of blood products contain B19V DNA below this threshold. *Kleinman SH. Blood. 2009 - Williams et al, Transfus Med 2022*
only 50% of components with more than 10^5 IU/mL transmit B19V *Houfar Transfusion 2011*
<10% of seronegative recipients transfused with VLs <10^6 are infected *Kleinman SH. Blood. 2009*

Presence of neutralizing antibodies in blood components provide protection for recipients

1/3 of B19V DNA BD with a VL > 10^5 UI/mL - 100% of B19 DNA BD with a VL <10^5 UI/mL

Schmidt M Transfusion 2007

Most B19V-positive donations, especially those with low DNA concentrations, are therefore unlikely to present an infectious risk to recipients

PARVOVIRUS B19V AT- RISK RECIPIENTS

Recipients of fresh blood components are at lower risk than those of PDMPs due to the cumulative risk associated with plasma derived products and to the partial efficacy of viral inactivation methods even though PDMPs also contain B19 Ab

2024: ecdc estimated the risk for B19V infection in 4 groups

- general population: the risk is low, as most infections result in mild childhood disease, even though complications can occur
- pregnant women: the risk is low to moderate, particularly below 20 weeks gestation, due to uncertainties about viral circulation; serious outcomes however, are rare
- immunocompromised individuals, including transplant patients: the risk is moderate, as these patients may experience chronic anemia, pancytopenia, graft loss, or organ-invasive disease
- individuals with chronic hematologic diseases (e.g., sickle cell anemia, thalassemia): the risk is moderate, with B19V potentially causing transient aplastic crises.

MEASURES TO MITIGATE THE RISK OF B19 TRANSFUSION TRANSMISSION

In the vast majority of blood services internationally, donations intended to prepare blood components are not tested for B19V considering the risk moderate

The Netherlands : (ministerial decision in 2002) blood components from donors are considered as “safe for B19V” if the donors test positive for IgG antibodies in two samples at a six-month interval

Styles et al Transfusion 2019 (AUS) estimated the B19 transfusion risk associated with a blood component with a VL >10E 5 IU/ml at 1 significant complication in 300,000 fresh blood product transfused and at 1/15,000 for more vulnerable recipients .>> TT-B19 V is a tolerable risk to blood safety

ECDC threat assessment after the 2024 outbreak : Additional systematic testing of blood donors for B19V infection is not required. However, if a B19V infection is suspected or confirmed for a donor, the B19V-positive blood or blood components should not be transfused to individuals susceptible to severe clinical outcomes of B19V infections.

European Pharmacopoia (2001) made the screening of B19V by NAT mandatory in plasma pools used for anti-D immunoglobulins production, with a maximum of 10^4 IU/mL . This screening is considered a control measure in the manufacturing process of PDMPs rather than a screening of individual donations.

B19V NAT : THE FRENCH EXPERIENCE

B19V NAT is not mandatory but performed in all blood donations to limit the risk of transmission by PDMPs
This testing is done by the French transfusion public service (EFS) for the French fractionation company (LFB) since 2015.

3 periods	Method	« positivity » threshold	Resolving	« positivity » threshold	N Donations excluded from the fractionation process	Delay between donation and results of B19V NAT	Blood components from positive donation included in MP96 pos transfused
2015 to March 2023	MP 96 duplex assay Procleix HAV/B19 assay (Tigris/Grifols)	10E4 IU/mL	2 pools of 48 donations	2*10E4 IUml	48	10-30 days	YES
April 2023 – June 2024	MP 96 DPX Parvo/HAV (Cobas 8800/Roche)	10E4 IU/mL	16 pools of 6 donations	10E6 IU/mL	6	2-4 days	YES
19 June 2024 -	MP 96 DPX Parvo/HAV (Cobas 8800/Roche)	10E4 IU/mL	16 pools of 6 donations and single testing	10E6 IU/mL	1	2-4 days	NO

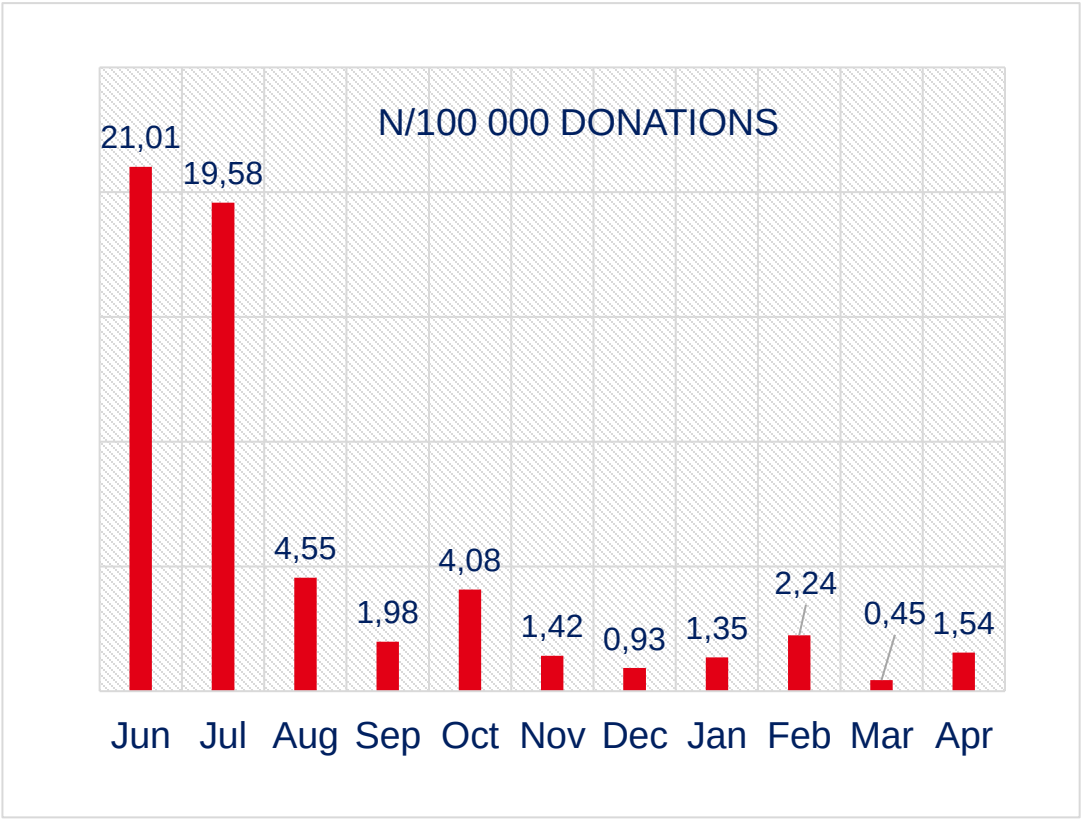
B19V NAT POSITIVE DONATIONS IN FRANCE JUN 2024-APR 2025

98 donations were “positive” >10E6 IU/ml

Mean rate 4,3 / 100 000 donations (0.45-21.0)

12 components from 8 positive donations transfused (5 from overseas)

- 4 RBC → 1 adverse reaction
- 8 WBPC → 1 adverse reaction



CASE 1

Donor

Regular asymptomatic
B19V “positive” result obtained at Day 3 post donation
1 platelet unit transfused
RBC, plasma, a second plat unit : discarded

Recipient

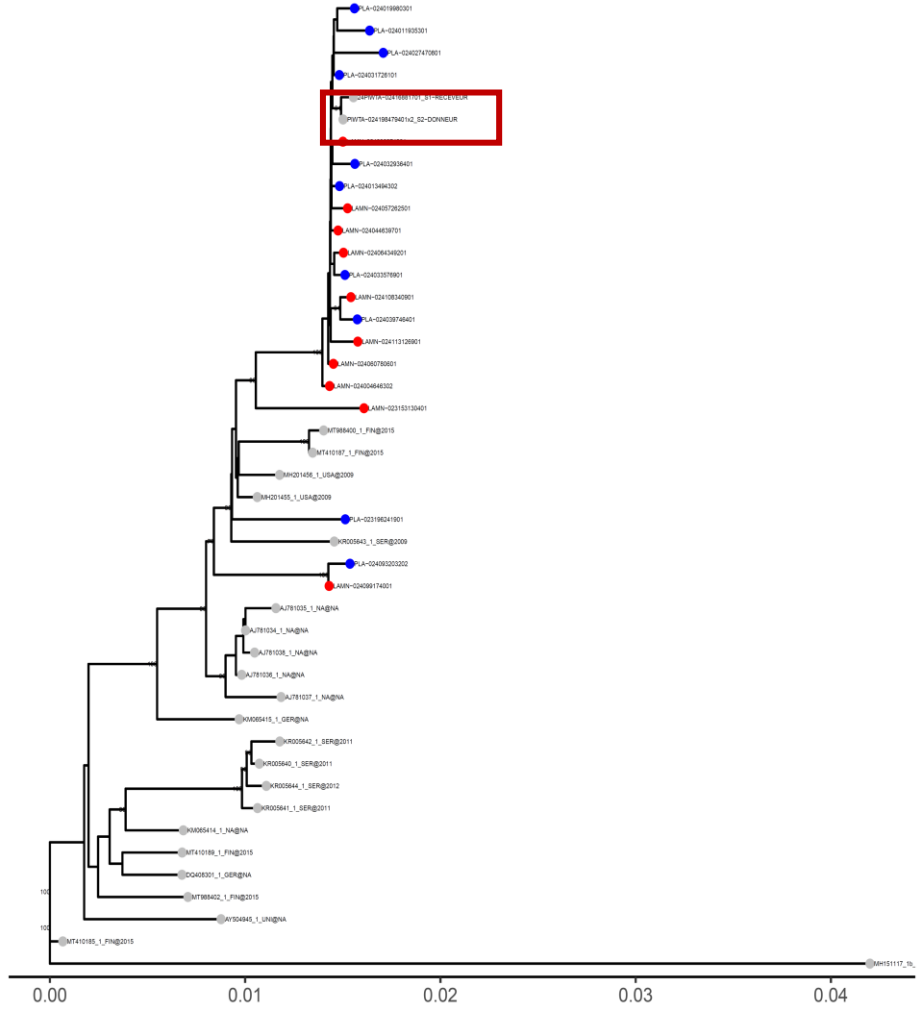
71 Years chronic lymphocytic leukemia
Transfused with a WBPC 1 day prior to the B19V result
Deep anemia requiring multiple transfusions– fever
At month 3 post transfusion :

VL 25 000 000 IU/ml

IgM-/IgG-

M6 post transfusion still B19V DNA positive

Transfusion transmission proven by strain comparison



CASE 2

Donor

Regular asymptomatic BD in the Reunion Island
B19V “positive” result obtained at day 23 post donation (testing in Metropolitan France)
PC and RBC transfused

RBC Recipient

30 years sickle cell disease
transfused 6 days prior to the B19V testing result
Day 14 post transfusion : B19V positive
No strain comparison

PC Recipient

Not infected (seropositive before transfusion)

CONCLUSION (1)

Lessons from recent B19V epidemics

- B19V blood testing screening can serve as an early warning of an epidemic

- A high-level of B19V circulation has an impact on the number of donations excluded from plasma fractionation even though this impact can be limited by resolving the positive pools into pools of decreasing size. A resolution to unit could be considered to limit plasma loss during intense and prolonged epidemics.

Lessons from French B19V NAT experience

- B19V DNA blood testing for plasma intended for fractionation performed in blood services contributes to avoid transmissions by fresh blood products but only if the positive donation can be identified and before the transfusion especially of platelet components.

- In France, B19V NAT positive pools resolved at individual level allowed to avoid several transmissions by transfusion. Only 2 adverse reactions were reported confirming that severe cases resulting from B19V transfusion are rare, unless unreported.

CONCLUSION (2)

Outstanding issues

- Do we need a stock of Parvo-Free fresh blood components for at-risk patients as immunocompromised, sickle-cell-affected children and pregnant women?
- If so, what is the appropriate detection threshold to adopt?
- Does the detection of positive donations at donor level require a deferral delay ?

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MERCI

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